# CONSERVATION PRACTICE STANDARD

# MULCHING
# (Ac.)
# CODE 484

## DEFINITION

Applying plant residues, by-products or other suitable materials produced off site, to the land surface.

## PURPOSES

- Conserve soil moisture
- Moderate soil temperature
- Provide erosion control
- Suppress weed growth
- Establish vegetative cover
- Improve soil condition and increase soil fertility

## CONDITIONS WHERE PRACTICE APPLIES

This practice applies to all lands where mulches are needed. This practice may be used alone or in combination with other practices.

## CRITERIA

### General Criteria Applicable to All Purposes

The selection of mulching materials will depend primarily on site conditions and the material's availability. Mulch materials shall consist of natural and/or artificial materials, such as plant residue, wood bark or chips, by-products, gravel, plastic, fabric, animal manure, rice hulls, and materials from food processing plants or other equivalent materials of sufficient dimension (depth or thickness) and durability to achieve the intended purpose for the required time period.

Mulching should be performed as soon as possible seeding and plantings are complete. Select the type of mulch and application rate for the desired purpose and to meet land owner objectives from Table 1.

Determine the need for anchoring the mulch and the best method for anchoring the mulch for the desired purpose and to meet landowners objectives from Table 2.

The mulch material shall be evenly applied and anchored to the soil. Tackifiers, emulsions, pinning, netting, crimping or other acceptable methods of anchoring will be used if needed to hold the mulch in place for specified periods.

Manufactured mulches shall be applied according to the manufacturer's specifications.

Mulching operations shall comply with federal, state and/or local laws and regulations during the installation, operation and maintenance of this practice.

Mulch material shall be relatively free of disease, noxious weed seeds, and other pests and pathogens.

### Additional Criteria to Conserve Soil Moisture

Mulch materials applied to the soil surface shall provide at least 60 percent cover to reduce potential evaporation.

Mulch material shall be applied prior to moisture loss. Prior to mulching, ensure soil under shallow rooted crops is moist, as these crops require a constant supply of moisture.

### Additional Criteria to Moderate Soil Temperature

Mulch materials shall be selected and applied to obtain 100 percent coverage over the area treated. The material shall be of a significant thickness to persist for the period required for the temperature modification.

### Additional Criteria To Provide Erosion Control

When mulching with cereal grain straw or grass hay, apply in sufficient amounts to provide 70 percent ground cover.

When mulching with wood products such as wood chips, bark, or shavings or other wood materials, apply to a 2-inch thickness if the soil is not well-drained; and to a 3 to 4-inch thickness if drainage is good. More finely textured mulches, which allow less oxygen penetration than coarser materials should be no thicker than 1 or 2 inches. The mulch material shall provide no greater than 80 percent ground cover in order to ensure adequate air drainage.

Gravel or other inorganic material shall be applied approximately 2 inches thick and shall consist of pieces 0.75 to 2 inches in diameter. The mulch material shall provide no more than 90 percent ground cover in order to ensure adequate air drainage.

### Additional Criteria to Suppress Weed Growth

The thickness of mulch will be determined by the size of the plant being mulched. Small plants must not be smothered. Mulches shall be kept clear of the stems of plants where disease is likely to occur. Mulches applied around growing plants or prior to weed seedling development shall have 100 percent ground cover. Thickness of the mulch shall be adequate to prevent emergence of targeted weeds. Plastic mulches may be used.

### Additional Criteria to Establish Vegetative Cover

Mulch shall be applied at a rate that achieves 50 percent ground cover to provide protection from erosion and runoff and yet allow adequate light and air penetration to the seedbed to ensure proper germination, emergence, and disease suppression.

### Additional Criteria to Improve Soil Condition and Increase Soil Fertility

To increase soil fertility, apply mulch materials with a carbon to nitrogen ratio (C:N) less than 30 to 1 such as animal manure, bio-solids, food processing wastes, or similar materials. Apply other practices such as contouring, filter strips or riparian forest buffers to assure that runoff from the mulched areas will not transport mulching materials to sensitive waterbodies. Do not apply mulch with C:N less than 20:1 to the area of designed flow in watercourses.

## CONSIDERATIONS

Consider the effects of mulching on evaporation, infiltration and runoff. Mulch material may affect microbial activity in the soil surface, increase infiltration, and decrease runoff, erosion and evaporation. Increased infiltration may increase nutrient

and chemical transport below the root zone. The temperature of the surface runoff may also be lowered.

Mulched soil retains moisture, requires less watering and reduces the chance of water stress on plant materials. Mulch also minimizes evaporation from the soil surface and hence reduces losses from bare soil areas.

Mulch materials high in organic matter with a high water holding capacity and high impermeability to water droplets may adversely affect the water needs of plants.

Clear and Infra Red Transmissible (IRT) plastics have the greatest warming potential. They are transparent to incoming radiation and trap the longer wavelengths radiating from the soil. Black mulches are limited to warming soils by conduction only and are less effective.

Clear mulches allow profuse weed growth and may negate the benefits of soil warming. Black mulches provide effective weed control. Wavelength selective (IRT) blend the soil warming characteristics of clear mulch with the weed control ability of black mulch.

Consider potential toxic allopathic effects that mulch material may have on other organisms. Animal and plant pest species may be incompatible with the site.

Consider the potential for increased pathogenic activity within the applied mulch material.

Keep mulches 3 to 6 inches away from plant stems and crowns to prevent disease and pest problems.

Deep mulch provides nesting habitat for ground-burrowing rodents that can chew extensively on bark on tree trunk and/or tree roots. Light mulch applied after the first cold weather may prevent rodents from nesting.

## PLANS AND SPECIFICATIONS

Specifications shall be prepared for each site and purpose and recorded using approved specification sheets, job sheets, technical notes, and narrative statements in the conservation plan, or other acceptable documentation. Documentation shall include:

- Type of mulch material used
- Percent cover and/or thickness of mulch material
- Timing of application
- Site preparation
- Listing of netting, tackifiers, or method of anchoring, and
- Operation and maintenance.

## OPERATION AND MAINTENANCE

Mulched areas will be periodically inspected, and mulch shall be reinstalled or repaired as needed to accomplish the intended purpose.

Removal, incorporation, bio- or photo-degradation of much and associated materials shall be consistent with the intended purpose and site conditions.

Operation of equipment near and on the site shall not compromise the intended purpose of the mulch.

Prevent or repair any fire damage to the mulch material.

Properly collect and dispose of artificial mulch material after intended use.

Monitor and control undesirable weeds in mulched areas.

## REFERENCES

Agriculture and Agri-Food Canada. 2000. Plastic Mulches for Commercial Vegetable Production. Canada-Saskatchewan Irrigation Diversification Centre. Outlook, Saskatchewan.

Natural Resources Conservation Service. 2000. National Agronomy Manual 190-V. USDA-NRCS. Washington, D.C.

Shaffer, M.J., and W.D. Larson. 1987. NTQM, A Soil-Crop Simulation Model for Nitrogen, Tillage, and Crop Residue Management. U.S. Department of Agriculture, Agricultural Research Service. Conservation Research Report 34-1. Pp. 83.

Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service.

# GUIDE TO MULCH MATERIALS, RATES, AND USES

| Mulch Material | Quality Standards | Application Rates per 1,000 sq. ft. | Application Rates per acre | Depth of Application | Remarks 1/ |
|---|---|---|---|---|---|
| Asphalt Emulsion | SS-1 SS-K SM-K SM-2 | 14-28 gal. | 600-1,200 gal. | -- | Use as a film on seeded areas without additional mulch. Requires special equipment to apply. Application rate critical--too much prevents seedings from penetrating and too little prevents erosion control. |
| Bagasse -Shredded Sugar Cane | Air-dried, well shredded | 200-400 cu. ft., 14-28 bales | -- | 2"-4" | Most effective as a mulch around ornamentals, trees, shrubs, and small fruit. Excellent for erosion control. Resistant to wind blowing. Packaged in 100 lb. bales. Decomposes slowly. |
| Cocoa Bean or Peanut Hulls | Air-dried free from excessive fine materials | 200-400 cu. ft. | -- | 2"-4" | Most effective as a mulch around ornamentals. Excellent moisture conserver. Decomposes in about one year. Subject to wind blowing. Packaged in 50 lb. bags. |
| Compost or Manure | Well shredded; free from excessive coarse material. | 400-600 lbs. | 8-10 tons | -- | Use strawy manure where erosion control is needed. May create problem with weeds. Excellent moisture conserver. Resistant to wind blowing. |
| Cornstalks, Shredded or Chopped | Air-dried, shredded into 8″ to 12″ lengths. | 150-300 1bs. | 4-6 tons | -- | Effective for erosion control, relatively slow to decompose. Excellent for mulch on crop fields. Has about same value as a cover crop. Resistant to wind blowing. |
| Gravel, Crushed Stone or Slag | Washed; size 2B or 3A | 9 cu. yds. | | 3" | Excellent mulch for short slopes and around woody plants and ornamentals. Use 2B where subject to foot traffic. (Approx. 2,000 lbs./cu. yd.) |
| Hay or Straw | Air-dried; free from undesirable seeds and coarse materials. | 75-100 1bs. | 1.5-2.5 T. | Lightly cover 75 to 90% of surface. | Use straw where mulch effect is to be maintained for more than 3 months. Subject to wind blowing unless kept moist or tied down. Most common and widely used mulching material. Good for erosion control in critical areas. |

TABLE 1 (Cont'd.)

## GUIDE TO MULCH MATERIALS, RATES, AND USES

| Mulch Material | Quality Standards | Application Rates per 1,000 sq. ft. | Application Rates per acre | Depth of Application | Remarks 1/ |
|---|---|---|---|---|---|
| Peat Moss | Dried, compressed, free from coarse materials. | 200-400 cu. ft. | | 2'1-4" | Most effective as a mulch around ornamentals. Subject to wind blowing unless kept wet. Packaged 100 lb. bales (6 cu. ft.). Excellent moisture holding capacity. |
| Pine Straw or Needles | Air-dried, free from coarse objectionable material. | 50-901bs. | 1-2 tons | | Use at 2 ton/ac. where erosion control is desired. Resistant to wind blowing. Decomposes slowly. |
| Sawdust, Green or Composted | Free from objectionable coarse material. | 83-500 cu.ft. | | 1"-7" | Most effective as a mulch around ornamentals, small fruit, and other nursery stock. Special application rates--fruit trees 5-7"; blueberries 6”; vegetables and flowers 2-3"; blackberries and raspberries 4-71”; strawberries 3". Most resistant to wind blowing. Requires 30-35 lbs. N/ton to N deficiency while decaying mulch. 1 cu. ft. weighs 18 T., 24 lbs; |
| Tanbark | Air-dried, nontoxic. | 300-400 cu. ft. | | 3"-4” | Effective mulch around ornamentals. More resistant to wind blowing than peat moss. Excellent moisture holding capacity. Packaged in 50 lb. bags (approx. 2 cu. ft.). |
| Wood Chips or Shavings | Green or air-dried. Free from objectionable coarse materials. | 500-900 lbs. | 10-20 tons | 2"-7" | Has about the same use and application as sawdust but requires less N/ton (10-12 1bs.). Resistant to wind blowing. Decomposes slowly. |
| Wood Excelsior | Green or air-dried burred wood fibers .024" X .031" x 4”. | 90 lbs. (1 bale) | 2 tons | | Effective for erosion control. Tiedown usually not required. Decomposes slowly. Subject to some wind blowing. Packaged in 80-90 lb. bales. |

TABLE 1 (Cont'd.)

## GUIDE TO MULCH MATERIALS, RATES, AND USES

| Mulch Material | Quality Standards | Application Rates per 1,000 sq. ft. | Application Rates per acre | Depth of Application | Remarks 1/ |
|---|---|---|---|---|---|
| Wood Fiber Cellulose (Partly digested wood fibers) | Dyed green. No growth organism inhibiting factors. Air-dried 30% fibers 3.7mm or longer. | 25-30 lbs. | 1,000<br>2,000<br>1lbs. | | Suited to short slopes. When used for erosion control on critical area, double application rate. Apply with hydro-mulcher. No tie-down required. (Use only during normal growing season.) |

## MATS AND NETTING

| Mulch Material | Quality Standards | Unit Size | Unit and Weight | Area Covered Per Unit | Remarks |
|---|---|---|---|---|---|
| Twisted Kraft Paper Yarn | Plain weave, warp 7 per inch, filling 4 per inch selvage edge with polypropylene filament. | 45'1 x 250 yd. | Roll 100 lbs. | 312 1/2 Yds. | Use to hold seed and aid in germination without mulch. Tiedown according to manufacturing specifications. |
| Twisted Kraft Paper Yarn | Fungicide treated warp 1.1 pairs/in. filling 2.5/in. | 45" x 250 yds. | Roll 80 lbs. | 312 1/2 sq. yds. | Use over bare soil or sod to prevent erosion and hold seed. Good for waterways, critical slopes, and critical ditch bottoms. Tiedown with staples as per manufacturing specifications. |
| Jute, Twisted Yarn | Undyed, unbleached plain weave warp 78 ends/yd. weft 41 ends/yd. | 48” x 50 yds. or 48" x 75 yds. | Roll 60 lbs.<br><br>90 lbs. | 60 sq. yds.<br><br>100 sq. yds. | Use without additional mulch. Tiedown as per manufacturing specifications. Effective for erosion control on critical areas. |

TABLE (Cont'd).

## MATS AND NETTING (continued)

| Mulch Material | Quality Standards | Unit Size | Unit and Weight | Area Covered Per Unit | Remarks |
|---|---|---|---|---|---|
| Excelsior Wood Fiber Mats | Interlocking web of excelsior fibers with a mulch net backing on one side only. | 36'1 X 30 yds. | Roll | 1.6 1/2 sq. yds. | **Use without additional mulch. Tiedown as per manufacturing specifications.** |
| Glass Fiber | 1/4" thick, 7/16 dia., holes on 1" centers. | 72" x 30 yds. | Roll 56 lbs. | 100 sq. yds. | Use without additional mulch. Tiedown with T bars as per manufacturing specifications. |
| Plastic | 2-4 mils. | Variable up to 50' wide. | | | Use black for weed control; use white for seeding establishment without organic mulch. Release plastic after seeding is established. Effective moisture conservation and weed control for small fruits. |

1/If All mulches will provide some degree of (1) erosion control, (2) moisture conservation, (3) weed control, and (4) reduction of soil crusting.

# MULCH ANCHORING GUIDE

| Anchoring Method or Material | Kind of Mulch to be Anchored | How to Apply |
|---|---|---|
| **A. Manual** | | |
| 1. Peg and Twine | Hay or straw, shredded sugar cane or cornstalks. Pine straw. | After mulching, divide area into blocks approximately 1 sq. yd. in size. Drive 4-6 pegs per block to within 2″ to 3″ of soil surface. Secure mulch to soil surface by stretching twine between pegs in a crisscross pattern on each block. Secure twine around each peg with two or more turns. Drive pegs flush with soil where mowing and maintenance is planned. |
| 2. Mulch netting | Hay or straw, shredded sugar cane or cornstalks, pine straw, com- post, wood shavings, tanbark. | Staple light-weight paper, jute, wood fiber, or plastic nettings to soil surface according to manufacturer's recommendations. |
| 3. Soil and stones | Plastic | Plow a single furrow along edge of area to be covered with plastic, fold about 6" of the plastic into the furrow and plow furrow slice back over the plastic. Use stones to hold plastic down in other places, as needed. |
| 4. Slit | Hay, straw or cornstalks | Cut mulch into soil surface with a square-edged spade. Make cuts in contour rows spaced 18" apart. |
| **B. Mechanical** | | |
| 1. Asphalt spray | Cocoa beans or peanut hulls, compost, wood chips, wood shavings, hay or straw, shredded sugar cane or corn-stalks. | Apply with suitable spray equipment using the following rates: asphalt emulsion 0.04 gallons per square yard; liquid asphalt (rapid, medium, or slow setting) 0.10 gallons per square yard. |
| 2. Pick Chain | Hay or straw, cornstalks, manure, compost, pine straw. | Use on slopes steeper than 3 to 1. Pull across slopes with suitable power equipment. |

TABLE 2 (Cont'd.)

## MULCH ANCHORING GUIDE

| Anchoring Method or Material | Kind of Mulch to be Anchored | How to Apply |
|---|---|---|
| 3. Mulch anchoring tool or disk (smooth or notched) | Hay or straw, manure, corn-stalks, pine straw. | Apply mulch and pull a mulch-anchoring tool over mulch. When a disk (smooth) is used, set in the straight position and pull across the slope with suitable power equipment. Mulch material should be tucked into the soil surface about.3 inches. |
| 4. Wood cellulose fiber | Hay or straw. | Apply 750 pounds in 2,000 gallons of water per acre. |
| 5. Hemicellulose | Hay or straw | Apply according to manufacturer's recommendation. Material is water soluble until cured. Use when the weather is dry during the growing season. |